# "ITS Focus Report on System Architecture": Comments and Critique

The National ITS Architecture Team reviewed the "ITS Focus Task Force on System Architecture Report", dated May 1997. The comments collected during this review are documented in this summary.

Overall, the ITS Focus report reflects a clear understanding of the importance and utility of an ITS architecture. It presents a generally balanced review of the US Architecture and makes a good case in identifying factors that could force a unique architecture solution for the United Kingdom.

While the report generally endorses the National ITS Architecture and US DOT's associated initiatives, a few comments are made by the report in the context of this positive message. For the most part, the comments are informative and reflect issues we are encountering elsewhere. In a few instances, the representation of the US National ITS Architecture is inaccurate.

Section I .3 gives a very nice, short explanation of what system architecture is, and how it differs from system design. Unfortunately, the summary of the US Architecture in Section 2.2 (particularly the second paragraph) is somewhat muddled. It is apparent that the analysis team understood very well the point of doing a system architecture and the main thrusts and results of the US program. In some cases they are a bit less precise on some of the specifics of what was done and why.

Some assessments are particularly troublesome. In Section 3.1, on page 15, is a list of "Features of the US National ITS Architecture approach" that contains several incorrect assertions:

*"The ITS Architecture has been specifically designed to be independent of any underlying organisational structure"*

> Quite the opposite, the Architecture has been designed to accommodate existing institutional boundaries. This is the only way that the work could be understandable and acceptable to US stakeholders.

*"The study takes a clean sheet to ITS and makes little reference to results of US research or of adopting experience gained by other countries including results from Europe"*

> Unfortunately, for the sake of expediency, we stopped putting literature citations and references to supporting documentation into the National ITS Architecture documentation in 1994. The reality is that existing systems and practices were enormously influential factors on the US Architecture. This included site visits to the UK and Germany, and examination of DRIVE I and II initiatives like ROMANSE, CAR-GOES, and other efforts.

*"The in-car systems will support MAYDAY call-out facilities because roadside telephones are not commonplace"*

> The envisioned MAYDAY services would go far beyond the service provided by a call box, and would additionally serve those too injured or endangered to leave their cars and hike to a telephone.

The report finds the use of dedicated short range communications in the US Architecture to be over-restrictive with regard to potential UK/European applications. The greater population density and smaller geographic size of the UK may make DSRC a more attractive solution for a broader range of services. The report's assertion that beacon-based route guidance will prove desirable in the short term in the UK should be validated against the cost of deploying a national temporary

infrastructure in the UK to support this.

The report finds that the US Architecture is deficient in the use of DSRC for Medium Range Pre-Information (MRPI) and specialized private information services (gas prices). These potential omissions should be reviewed further to ensure that the US Architecture continues to reflect the latest thinking in potential ITS DSRC applications for the US. In some cases, these additional DSRC services may be beyond the 30 user services covered by the Architecture. Such issues should be reviewed as part of the on-going US Architecture maintenance effort.

The assertions that the US Architecture does not support pre-payment options and road and traffic conditions using DSRC are incorrect. These applications/approaches are indeed supported by the Architecture. The prepayment options, while supported by the US Architecture, do not require as much focus as the more complex interactions needed for credit or account-based debiting. The statement that the US Architecture does not support the transfer of variable traffic information, like variable speed limits, is also incorrect. This type of information is supported by the in-vehicle signing service which is fully represented in the US Architecture.

The report identifies specific areas where the on-going technology revolution is already beginning to date the Architecture products. Specific examples that are identified include digital communications, JAVA, and object oriented distributed systems strategies including the Common Object Request Broker Architecture (CORBA). The US Architecture team has encountered and is monitoring the same issues. For example, the US Architecture team is working closely with the NTCIP Center to Center standards committee to reconcile the US Architecture with CORBA implementations. In short, such advancements underscore the importance of maintaining the highest possible level of technology independence in the architecture definition, as was done in the US Architecture.

In several instances, the report discusses the pros and cons of the non-prescriptive nature of the Architecture. For instance, the report states:

> *"We judge that in the effort to be non-prescriptive, the architecture has, with some important exceptions become almost totally permissive and all-encompassing. . ..The architecture itself therefore cannot prevent the proliferation of different systems by the market. To achieve that objective it must be supported by follow-up actions, as explained in chapter 2."*

Here, the authors have adopted a pervasive, and somewhat incorrect view of the US Architecture as completely permissive. Frequently, in our interactions with US ITS stakeholders, this same view is expressed (i.e., "As long as you don't do route guidance through beacons, you are compliant with the Architecture"). The US Architecture actually embodies very specific functional allocations and information transfer requirements and urges the use of open standards for its identified interfaces. These basic tenets of the Architecture actually provide significant direction to current deployment and standards activities. The authors do correctly identify that the Architecture must be further supported by follow-up actions (e.g. policy directives and standards) to fully achieve the intended goals.

This ITS Focus report ultimately promotes the idea of ITS Focus developing a government-sponsored architecture program. This may have pre-ordained that the result of the report was that a system architecture is very important, but the US Architecture won't quite do the job for the UK. Given this vested interest, the report nonetheless seems well thought out and generally accurate in its review of the US program.